

Features & Benefits

Min operating temp of -100°C with TE cooling

Unparalleled TE cooling performance for negligible dark current, without the aggravation or safety concerns associated with LN₂.

Fringe Suppression Technology™

Minimizes fringing (etaloning) effects

Peak QE of >90%, optimized for NIR

Very High detector sensitivity in near infra-red.

Multi-Megahertz pixel readout

High frame rates achievable.

Simple USB connection

Simple USB 2.0 connection direct from back of camera – no controller box required!

Industry fastest vertical shifts

3µs temporal resolution in 'Fast Kinetics Acquisition' mode.

Single window design, incorporating UltraVac™ guaranteed hermetic vacuum seal technology

Ultimate reliability and sustained lifetime performance characteristics with maximum photon throughput.

Cropped sensor mode

Specialised acquisition mode for continuous imaging with fast temporal resolution.

Enhanced Baseline Clamp

Essential for quantitative accuracy of dynamic measurements.

13 x 13µm pixel size

Optimal balance of dynamic range and resolution

Andor Solis software / SDK

(Linux SDK available)

Friendly Windows user interface offers intuitive acquisition optimization, system integration, automation and advanced data manipulation facilities.

Integrated shutter

C-mount shutter as standard. Close during readout to avoid vertical smear.

“Deep Depletion Model for NIR Imaging”

Andor's iKon-M 934N BR-DD is designed to offer ultimate performance for NIR applications, delivering > 90% QE beyond 800nm. Andor's 'BRD' cameras are the only Deep Depletion systems that incorporate Fringe Suppression Technology™ to minimize fringing effects.

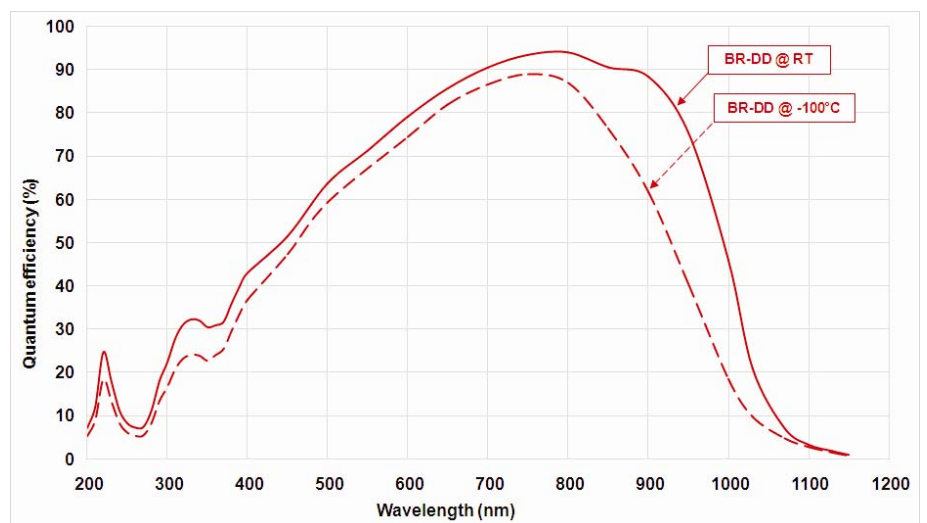


The 1024 x 1024 array boasts high resolution 13µm pixels, and benefits from negligible darkcurrent with thermoelectric cooling down to -100°C, critical to optimize the sensitivity of Deep Depletion sensors. The iKon-M platform offers both multi-Megahertz readout and USB 2.0 connectivity. Industry fastest vertical shifts combined with fast kinetics acquisition mode, comprehensive trigger modes and custom coated wedge window render the DU934N BR-DD an ideal solution for NIR optimized Bose Einstein Condensation applications

Key specifications

Active Pixels* ¹	1024 x 1024
Pixel Size (W x H; µm)	13 x 13
Image Area (mm)	13.3 x 13.3
Active Area Pixel Well Depth (e ⁻ , typical)	100,000
Output Saturation (e ⁻ , typical)* ²	200,000
Frame Rate (frames per sec)* ³	2.25
Read Noise (e ⁻ , typical)	
@ 50 kHz	2.5
@ 2.5 MHz	10.3

Quantum efficiency*⁴



Technical specifications

System characteristics

Dummy Pixels	24, 24, 3, 3
Pixel Readout Rate (MHz)	2.5, 1, 0.05
Linearity (% maximum)*5	1
Vertical Clock Speed (µs)	3 to 44 (software selectable)
Software Selectable Sensitivity (e ⁻ per A/D count, typical)	4, 2, 1
Digitization	16 bit (at all readout speeds)
Camera window type	Single quartz window. NOTE: Custom coated windows can be ordered on request, (e.g. optimized for 780nm Rubidium BEC experiments).

System readout noise*6

Pixel Readout Rate (MHz)	Readout Noise (e ⁻ , typical)
0.05	2.8
1	7.0
2.5	9.0

Minimum sensor temperatures (typical)*7

Air cooled (ambient air at 20°C)	-80°C
Re-circulator (XW-RECR) (ambient air @ 20°C)	-95°C
Water-cooled (@ 10 °C, 0.75 l / min)	-100°C

Dark current (back-illuminated)

@ -80°C (typical)	0.01 e ⁻ /pixel/sec
@ -100°C (typical)	0.0005 e ⁻ /pixel/sec

Operating & storage conditions

Operating Temperature	0°C to 30°C ambient
Relative Humidity	< 70% (non-condensing)
Storage Temperature	-25°C to 55°C

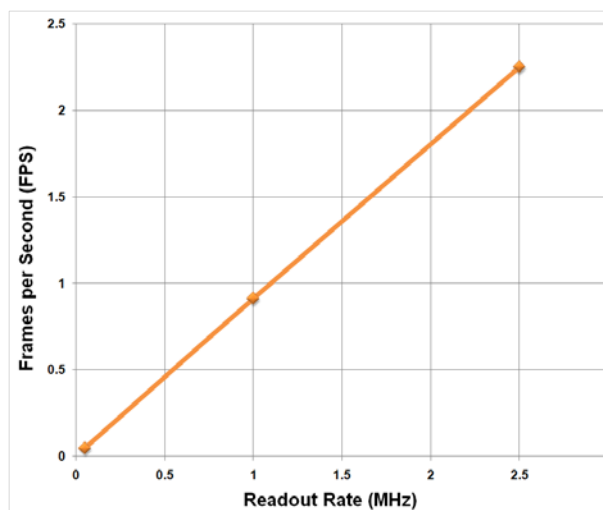
Power requirements

- 5Vdc - 3.2 A
- 7.5Vdc - 4.5A
- ±15Vdc - 0.4A



Rear view showing connections

Full frame rate*8



Max frames per second*9

Binning	1MHz			
	Full Frame	512 x 512	256 x 256	128 x 128
1x1	0.91	1.81	3.58	7.0
2x2	2.9	4.39	7.68	13.98
4x4	8.03	9.54	15.3	26.1
8x8	18.57	18.86	28.24	44.84

Binning	2.5MHz			
	Full Frame	512 x 512	256 x 256	128 x 128
1x1	2.25	4.4641	8.76	16.87
2x2	5.78	9.82	17.73	32.051
4x4	12.96	19.76	33.4	56.28
8x8	25.63	36.46	57.67	89.13

Computer requirements

The following minimum specification is recommended:

- 3.0 GHz single core or 2.4GHz multi core processor + 2GB RAM
- 100 MB free hard disc to install software (at least 1GB recommended for data spooling)
- USB 2.0 High Speed Host Controller capable of sustained rate of 40MB/s
- Windows (XP, Vista and 7) or Linux

Regulatory Compliance

Compliant with the requirements of the EU EMC and LV Directives through testing to EN 61326-1 and EN 61010-1

Specifications are subject to change without notice

Ordering information & notes

To order this camera, please quote following model number:

DU934N-BR-DD

The DU934N BR-DD is supplied with the following power supply:

PS-25 Switchable power supply for maximum air or water cooling, with 2x settings; **standard** or **deep cooling**.

The DU934N BR-DD also require one of the following software options:

Andor Solis A 32-bit Windows compatible software application with rich functionality for data acquisition and processing. Will run under 32-bit and 64-bit Windows (XP, Vista and 7).

Andor SDK A software development kit that allows you to control the Andor range of cameras from your own application. Available for 32-bit and 64-bit Windows (XP, Vista and 7) and Linux

The following accessories are available for use with the DU934N BR-DD:

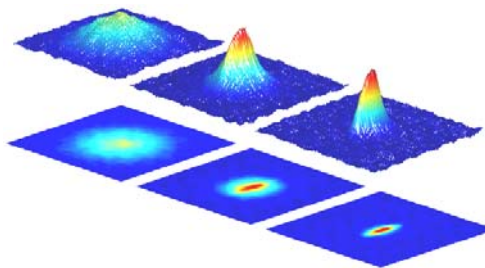
XW-RECR	Re-circulator for enhanced cooling performance
XW-CHIL-150	Chiller/re-circulator for maximum cooling performance
XU-TRAN	USB 2.0 Ranger - Transmitter
XU-RECR	USB 2.0 Ranger - Receiver
XU-POWR	15W External Power Supply. NOTE: The XU-TRAN & XU-RECR each need their own supply.
OA-CCFM	C-mount to Canon F-mount adapter
OA-CNAF	C-mount to Nikon F-mount adapter
OA-COFM	C-mount to Olympus F-mount adapter
OA-CTOT	C-mount to T-mount adapter
OA-ECAF	Auto ext. tubes (set of 3) for Canon AF
OA-ECMT	Auto ext. tubes (set of 3) for C-mount
OA-ENAF	Auto ext. tubes (set of 3) for Nikon AF

Key Applications

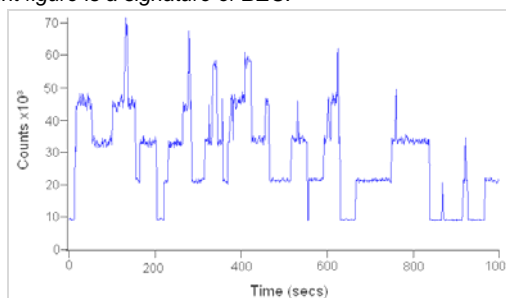
- Astronomy
- Biochip reading
- Bioluminescence/Chemiluminescence
- Bose-Einstein Condensation (BEC)
- Fluorescence microscopy
- High throughput screening
- Hyper-spectral imaging
- Laser Induced Fluorescence (LIF)
- Neutron Radiography
- Pressure sensitive paints
- Raman imaging
- Semiconductor analysis

NOTE:

- ◆1 Edge pixels may exhibit a partial response.
- ◆2 The output saturation that is actually accessible by the CCD system is dependent upon the sensitivity setting & binning mode selected.
- ◆3 Based on a horizontal pixel readout rate of 2.5 MHz and a vertical shift speed of 3μs.
- ◆4 Quantum efficiency of the CCD sensor as measured by the CCD Manufacturer.
- ◆5 Linearity is measured from a plot of counts vs. signal up to the saturation point of the system. Linearity is expressed as a percentage deviation from a straight line fit.
- ◆6 System Readout noise is for the entire system. It is a combination of CCD readout noise and A/D noise. Measurement is for Single Pixel readout with the CCD at a temperature of -50°C and minimum exposure time under dark conditions. Noise values will change with pre-amplifier gain (PAG) selection. Values quoted are measured with highest available PAG setting.
- ◆7 Cooling is provided by the use of an external, mains driven, power supply. Minimum temperatures listed are typical values. Systems are specified in terms of minimum dark current achievable rather than absolute temperature.
- ◆8 The graph shows the full frame rates possible when reading out the sensor at 2.5, 1 and 0.05 MHz pixel readout rates, using 3μs vertical clock speed.
- ◆9 Shown are the frame rates at 1 MHz and 2.5 MHz digitization rates for a range of binning or array size combinations. All measurements are made with 3μs vertical shift speed. It also assumes internal trigger mode of operation and 'zero' exposure time.



Surface plots of the transition from a thermal gas (left) to a Bose-Einstein condensate. The sharp, bimodal peak in the right figure is a signature of BEC.

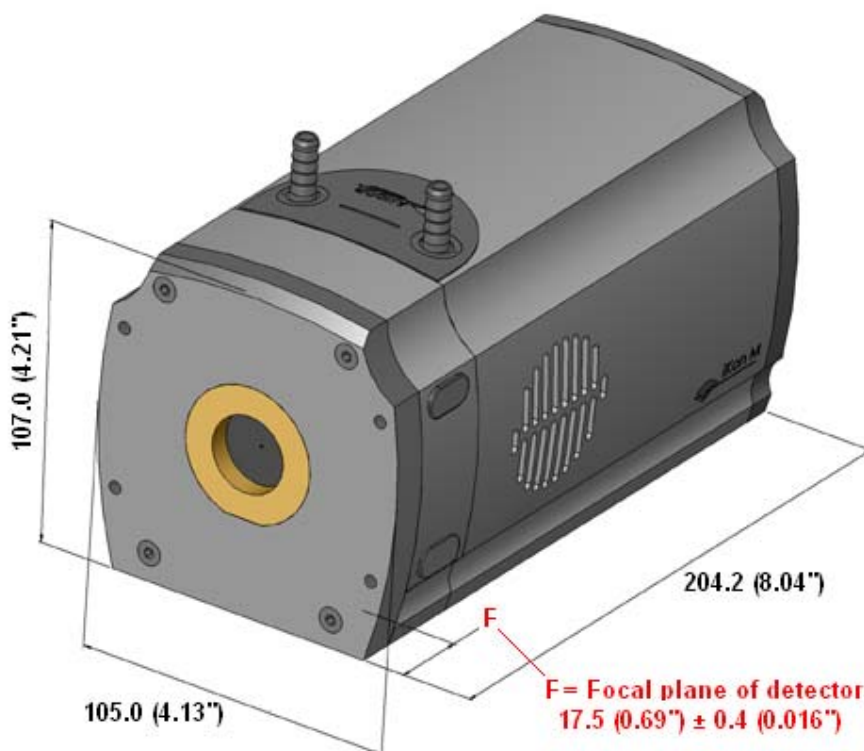


Fluorescence from a few-atom MOT v time, showing the discrete steps characteristic of single atoms entering and leaving the trap.

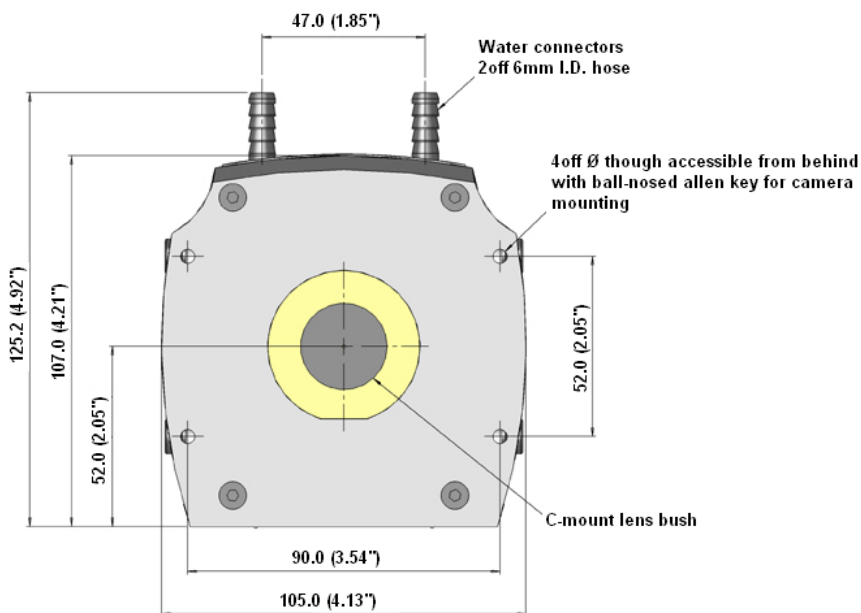
Dimensions

Side / front view

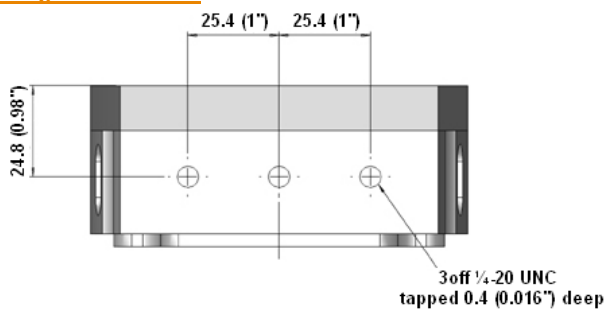
Weight: 2.6 Kg [5.7 lb]



Front face



Mounting hole locations



Need more information? Please contact us at:

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Phone: +44 28 9023 7126	Phone: +1 (860) 290 9211
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